

power; sixth means for emitting a fourth laser beam in a second direction after the fourth means emits the second laser beam or the fifth means emits the third laser beam, the second direction being different from the first direction, the fourth laser beam having the first power; seventh means for receiving an echo corresponding to the fourth laser beam; eighth means for determining whether or not the seventh means receives an echo corresponding to the fourth laser beam; ninth means for emitting a fifth laser beam in the second direction in cases where the eighth means have determined that the seventh means receives an echo corresponding to the fourth laser beam, the fifth laser beam having the second power; and tenth means for emitting a sixth laser beam in the second direction in cases where the eighth means have determined that the seventh means does not receive an echo corresponding to the fourth laser beam, the sixth laser beam having the third power.

A tenth aspect of this invention provides a distance measurement apparatus comprising first means for emitting a first laser beam in a first direction, the first laser beam having a first power; second means for receiving an echo corresponding to the first laser beam; third means for determining whether or not the second means receives an echo corresponding to the first laser beam; fourth means for emitting a second laser beam in the first direction in cases where the third means have determined that the second means does not receive an echo corresponding to the first laser beam, the second laser beam having a second power higher than the first power; fifth means for inhibiting the fourth means

from emitting the second laser beam in cases where the third means have determined that the second means receives an echo corresponding to the first laser beam; sixth means for emitting a third laser beam in a second direction after the fourth means emits the second laser beam or the fifth means inhibits the fourth means from emitting the second laser beam, the second direction being different from the first direction, the third laser beam having the first power; seventh means for receiving an echo corresponding to the third laser beam; eighth means for determining whether or not the seventh means receives an echo corresponding to the third laser beam; ninth means for emitting a fourth laser beam in the second direction in cases where the eighth means have determined that the seventh means does not receive an echo corresponding to the third laser beam, the fourth laser beam having the second power; and tenth means for inhibiting the ninth means from emitting the fourth laser beam in cases where the eighth means have determined that the seventh means receives an echo corresponding to the third laser beam.

BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 is a diagram of a distance measurement apparatus according to a first embodiment of this invention.

Fig. 2 is a diagram of directions in which a forward laser beam is outputted from a light emitting portion in Fig. 1.

Fig. 3 is a flowchart of a segment of a program for a microcomputer in Fig. 1.

Fig. 4 is a time-domain diagram of laser light emissions

implemented by the apparatus of Fig. 1.

Fig. 5 is a flowchart of a segment of a program for a microcomputer in a third embodiment of this invention.

Fig. 6 is a time-domain diagram of laser light emissions in the
5 third embodiment of this invention.

Fig. 7 is a flowchart of a segment of a program for a microcomputer in a fourth embodiment of this invention.

Fig. 8 is a time-domain diagram of laser light emissions in the fourth embodiment of this invention.

Fig. 9 is a time-domain diagram of laser light emissions in a
10 sixth embodiment of this invention.

Fig. 10 is a time-domain diagram of laser light emissions in a seventh embodiment of this invention.

Fig. 11 is a time-domain diagram of laser light emissions in an
15 eighth embodiment of this invention.

Fig. 12 is a time-domain diagram of laser light emissions in a ninth embodiment of this invention.

DETAILED DESCRIPTION OF THE INVENTION

First Embodiment

20 Fig. 1 shows a distance measurement apparatus according to a first embodiment of this invention. The apparatus of Fig. 1 is mounted on a vehicle (a subject vehicle). The apparatus of Fig. 1 measures the distance to an object from the subject vehicle. The object is, for example, an obstacle to the subject vehicle or a vehicle
25 traveling ahead of the subject vehicle.

The apparatus of Fig. 1 includes a light emitting portion 10, a